



FRUIT TREE BACKSTOPPING MISSION REPORT - OCTOBER 2000



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Contents

EXECUTIVE SUMMARY.....	1
1. NURSERIES	3
1.1 Mango.....	3
1.2 Jackfruit	6
1.3 Guava.....	6
1.4 Litchi.....	7
1.5 Citrus	7
1.6 Quality audits for nursery and planting materials	9
2. ORCHARDS	15
3. MOTHER TREE ORCHARDS	17
4. ADAPTATION TRIALS	18
5. TRAINING	18
6. RESEARCH	19
6.1 Research Strategy of Fruit Tree Improvement Activities	19
6.2 Prioritized research problems for the MS/Ph.D.	22
students of FTIP-BAU-DH under VFFP Phase-6	
7. DOCUMENTATION.....	22
8. NEXT MISSION	22
Annex-1: TERMS OF REFERENCE	23
Annex-2: PROGRAMME	26

EXECUTIVE SUMMARY

Bangladesh is one of the most densely populated countries in the world and as the population is continuing to increase it is faced with a tremendous challenge: augmenting its production on an ever-decreasing area of land. This challenge has resulted in Sustainable Land Use becoming one of the high priority sectors in Bangladesh and hence the Fruit Tree Improvement Project was created.

Its goal, in the short term, is to increase fruit production in order to meet the demands of the domestic market; and in the medium term to meet the demands of export markets, either as fresh or as processed products. For this second objective to materialise, a marketable surplus must be made available.

The objective of this second mission, from 13-29 October 2000, was to understand the project as a whole. During the first mission, only the Rajshahi and Dinajpur regions were targeted and it was therefore difficult to have a clear idea about the entire project. During our second stay we were able to offer the following analysis as to the problems encountered in regards to orchard nurseries and homesteads.

Visits to different nurseries, homesteads, and orchards, discussions with various participants in research, NGOs, nursery owners, as well as development specialists in the different regions of the country, have shown that the quality of the planting material was far from satisfactory.

Many nurserymen still collect the planting material outside their nursery in the easiest possible way, being concerned neither with sanitary quality nor with variety. Certain species continue to be propagated from seed even though this technique, because of the monoembryonic quality of the majority of species, does not reproduce true-to-type.

The potential yield anticipated by the tree farmers is reduced considerably in orchards with the use of plants raised from seeds or plants originating from just anywhere.

This project, therefore, has the following objectives:

1. To help the nursery owners increase their yield in quantity as well as in quality in order to participate in a sustainable production system. Access to improved techniques of multiplication will allow them to supply « elite » plants.
2. Promote access to, and the use of, good quality fruit trees by the tree farmer.
3. Improve fruit cultivation by promoting production techniques and management systems of fruit trees in a sustainable manner. This should reduce poverty; contribute to better and more balanced nutrition and safe guard the environment from the impact of fruit tree production.

Within this framework, the Department of Horticulture of the Bangladesh Agriculture University (BAU-DH), with its knowledge of fruit orchards and capacity for long term implementation, will play an important role. More particularly, nursery techniques as well as nursery management will require the following improvements :

- Mango trees and many other species must be 'cleft grafted' or, if this cannot be mastered, 'stone grafted' according to the technique of 'veneer grafting'.
- All plants must be multiplied in pots of the right size or simply in polythene bags.
- These pots or bags should be filled with a mixture 1/3 sand, 1/3 compost and 1/3 loam.
- Discontinuation of the practice of grafting which is too high and of multiple grafts on the same grafting branch.
- The choice of seeds must be reviewed as well as the method used for sowing.
- Monitoring of phytosanitary problems must be a priority in order to supply healthy plants.

Training must be one of the priorities of the project as many of the field supervisors are young and/or newly recruited. They must not only be trained in nursery techniques but be equally knowledgeable of the management techniques of orchards. Training will be given by VFFP (ARC) and should be combined with field work in such a way that these new recruits will rapidly become functional.

This year a scholarship programme for PhD and Master students will be starting at FTIP-BAU. The choice of subjects has to be based on the priority needs identified in the field. The PhD students are targeting the ICM of mango and guava but it is difficult to see how a single student can solve the complex problems of the parameters of multi- factored trials.

One important aspect must be dealt with by the University is the recurrent problem of mango malformation, which was observed in a large majority of the nurseries we visited. Perhaps there are varieties of mangoes more resistant than others to this disease. Together with the phytopathology laboratory, trials of introduced varieties should be established in order to test their susceptibility.

Grafting of the guava tree 'Kazi-piera' on 'Polly Piera' must be continued and the first inoculations of wilt disease should be quickly completed in the laboratory.

The first grafting trials of the Jackfruit are very encouraging and merit being closely monitored in order to be able to acquaint the nursery owners with this technique. The grafting will allow the formation of an interesting germplasm by the propagation of more attractive varieties which will be true-to-type.

1. NURSERIES

Throughout all of the nurseries visited, we encountered different styles and methods of management. Knowledge of production methods and horticultural practices are very heterogeneous. Size is not necessarily related to success.

Problems encountered

In a large majority of the nurseries visited we frequently noted the following problems :

- The nursery owners transfer multiplication techniques from the production of timber trees. These techniques do not correspond to those which should be used for the multiplication of fruit tree species.
- In certain zones, for example in the Jessore district, a great number of nurseries are installed on land which is inundated during the rainy season. For the production cycle of the plants to be undisturbed, the nurseries will have to be moved to elevated areas where there is a minimal risk of flooding.

In certain nurseries plants of different varieties are mixed in the same nursery bed. The diversity resulting from this mix makes it impossible to have a homogeneous control and tracing of plants. The varieties in the same nursery bed are seldom labelled which may result in mistaken varieties at the time of sale. This will have repercussions in the bed of future orchards.

It is imperative to start labelling plants and to establish homogeneous beds by species and varieties which are clearly separated from each other.

We will continue our analysis species by species:



Mixed seedlings in nursery beds – not desirable at all

1.1 MANGO

This is one of the most popular species for the farmers in the majority of the zones due to its adaptability to a wide climatic scale.

Choice of Seeds

Problems

At the moment, in a large majority of cases, the seeds are collected from the markets or from the unharvested fruits of an orchard. As a result there is a large and uncontrolled heterogeneity of mangoes. The different varieties which are sown have specific and unknown growth and quality characteristics, as opposed to grafting characteristics (compatibility, incompatibility).

Solutions

Be very rigid with the selection of seeds. These seeds will preferably be chosen in monovarietal orchards in order to reduce the risk of hybrid seeds which are frequent in mixed plantings of monoembryonic seed.

The results of research on this problem should quickly enlighten us on the choice of variety.

/Direct sowing

Problems

Direct sowing in nurseries leads to a heterogeneous development of young plants. This practice postpones the time of grafting for certain plants and does not allow for good management of space as certain seeds do not emerge.

Solutions

Establish a seed bed and carry out the transplanting immediately after the first flush of homogeneous lots of young plants which are at the 'green leaf' stage. This practice will produce homogeneous beds and thus reduce costs in nurseries by justifying the interventions of fertilisation, irrigation, pruning, grafting, post-grafting care, lifting and subsequent marketing.

/Spacing between transplanted seedlings

Problems

During my first mission, the majority of plants derived from direct sowing were spaced 8 to 15 cm apart. This practice does not allow for normal growth of plants and presents difficulty during lifting giving very small ball of earth with few roots. The subsequent recovery of the plant in the orchard is more doubtful.



Mango seedlings planted with uniform spacing

Solution

Refer to the practice in certain other nurseries. Seed bed, replanting with spaces of 25 to 30 cm.

/Type of containers

Problems

Normally, the technique consists of transplanting directly into the ground, nevertheless certain nurseries have started the transplanting into clay pots or plastic bags. In both cases the bags or pots are too small in diameter and too shallow. The root system is unable to form normally and quickly becomes entwined in the bottom of the container. This type of plant has a difficult recovery and sometimes suffers from a high mortality rate at the time of planting in the orchard.



Appropriate size of plastic bag for raising mango seedling

Solution

Carry out the replanting in pots or plastic bags of 20 to 25cm in diameter and 35cm in depth. Use a mixture of 1/3 sand, 1/3 compost and 1/3 loam.

/Harvesting of scions when the MTO is young

Problems

Frequently the MTOs established nearby or inside the nurseries are very young, between 2 months to 3 years, and the quantity of scions available in these MTOs is not sufficient to cover the needs of the nursery. Thus it often happens that the scions are harvested by the cheapest method, that is to say, from trees within close proximity to the nursery and that are occasionally carriers of disease. Moreover, with this method of grafting, the variety is often unidentifiable.

Solutions

Do a survey of grafting needs for nurseries. Together with the nursery owners study the possibility of access to graftings of good phytosanitary quality and recognised variety.

/Type and height of grafting

Problems

Normally, the grafting is done by 'veneer grafting'. This practice, which is used in numerous countries, is a good technique but is done at more than 1 m in height on the root stock. Sometimes, when the root stock is too high and has already been ramified, 2 or 3 grafts of different varieties are done on different branches of the same root stock.

The results of research done in India and Bangladesh have shown that cleft grafting could be done lower (25-30 cm) and would produce more vigorous plants.



Current practice: grafted too high, veneer

Solutions

Teach nursery owners the technique of cleft grafting, if they are not already familiar with it, and insure that they carry out the grafting at 25 and 30 cm from the ground.



Recommended practice: cleft grafting, low

/ Post-grafting care

Problems

We have noted a number of anomalies in the post-grafting care. With veneer grafting the root stock is very seldom pruned above the point of grafting.

Management consisting of weeding and fertilisation is rarely done. We observed deficiencies in nitrogen and boron in numerous nurseries. Prevention of disease and insects is either not effective or not observed because nursery owners are not very knowledgeable of parasites, disease and the management thereof. So treatment is either not undertaken at all or it is carried out with products which are not recommended.

Solutions

In the case of veneer grafting, immediately after the second flush the root stock will be pruned at 5 cm above the graft, then after two other flushes the root stock will be pruned level with the scion in order to force the growth of the young graft.

In the case of transplanting into the ground, fertilisation will have to be maintained every 15 days during the growing phase by regular applications of a solution comprising 10gr of urea, 6g of potassium sulphate which should be spread over an area of 10m².

Weeding must be maintained regularly to avoid competition between weeds and newly transplanted seedlings. As far as pest and disease prevention is concerned, nursery owners should be trained to identify their problems and should be informed as to the most effective products and the most appropriate times for treatment.

1.2 JACKFRUIT

Concerning this species, the problems have not been seen to be as serious as those of the mango tree.

The jackfruit is propagated by sowing. Some trials of vegetative propagation are in progress at BAU, Mymensingh, and the initial results are very promising.



Cleft grafting in jackfruit seems promising

However, in the case of sowing, there is much left to do even if only for non-grafted plants. These must be sown in beds and transplanted in plastic bags as soon as possible (4 well-marked leaves), in order to obtain erect plants with a well structured root system.

1.3 GUAVA

Problems

With this species, the main problem is wilt disease transmitted by soil. This is especially virulent on the variety 'Kazi Piara'.

This species, very much in demand by the farmers, continues to be propagated by sowing which leads to very heterogeneous orchards with sometimes rather mediocre results.



Wilt disease of guava

Solutions

Await the results from the trials which have started at BAU, Mymensingh, in order to reduce the problem associated with Wilt. The variety « Kazi Piara » is grafted on « Polly Piara » and seems promising.

On the assumption of the most positive of probable results, carry out the grafting of the guava tree in order to obtain homogeneous plants and orchards. A number of nursery owners have already started some experiments in this sense but are encountering difficulties due to scanty availability of good quality scions.

In order to increase the availability of scions it will be necessary to combine some varietal trials and establish Mother Tree Orchards in different zones. The propagation by air layering of the best varieties will quickly allow for the production of plants which have consistent varietal characteristics.



Experiment on grafting of Kazi piara on the roor stock of wilt resistant poly piara

1.4 LITCHI

Very few problems to report about this species: the propagation by air layering is correctly carried out. Nevertheless, it is observed that on certain branches there is too great a quantity of layering which will cause difficulties in recovery.

Branches which are attacked by the leaf curl mite must not be propagated. This insect is not controlled and is very dangerous for the orchards. It risks affecting the whole nursery and after that the orchards.



Leaf curl mite infested litchi leaves

Finally, it would be desirable for the young layerings to be transplanted in plastic bags to form a healthy root system before being supplied.

1.5 CITRUS

Problems

Most citrus is propagated by:

- cuttings
- air layering
- sowing



Huanglongbing (greening)



Citrus canker

This last technique has the advantage of not transmitting the majority of viruses and bacteria ; in the other cases of propagation (cuttings or layering) the transmission of degenerative viral or bacterial disease is inevitable. (CTV, Huanglongbing, Citrus canker).

Solutions

As soon as possible introduce and test the behaviour of the root stock descended from seed, adapted to the climate and compatible with varieties desirable for propagation such as :

- *Citrus Volkameriana*, root stock with great flexibility of use for lemon trees, lime trees and other citrus fruit.
- *Citrus macrophylla*, to be reserved for zones where CTV is absent and for non hydromorphous soil.

In various Asian countries, the following root stocks are already used on account of their adaptation to rice-growing zones :

- hybrid of the grapefruit tree and of the Seville orange-tree in Vietnam
- Calamandarin, a mandarine tree related to clamondin ; the mandarine tree
- Szinkom in the Philippines.
- *Citrus Amblicarpa* in Indonesia.

It is therefore necessary to procure seeds of these root stocks in order to test them and to introduce scions of varieties undamaged by known viruses, mycoplasmas and bacteria in order to produce only healthy plants. The mother planting material must be kept under an insect-proof shelter to avoid recontamination.

It is advisable to produce some simple manuals as quickly as possible. These should be well illustrated regarding the production of plants in the nursery and should be published regularly according to new techniques perfected in Bangladesh and throughout the world.

1.6 Quality Standards for Nurseries and Planting Materials

By M. N. ISLAM revised by C. Didier

A nursery is a farm specialized in commercial production of seedlings/plants. There are some specialised nurseries but nurseries more often produce a wide and varied choice of plants. The choice of the plants depends on the demand of the locality and the marketing facilities. Depending on the structure and life span, nurseries can be divided into 2 major types:

a. **Temporary nursery** - having the following features:

- established for a maximum of three years
- produces a few species only to meet local demand, individual demand or single area demand
- is usually set up near a plantation site for quick and easy transportation of seedlings
- may be abandoned when the plantation is completed or the specific demand has been met

b. **Permanent nursery** – having the following features:

- grows saplings for many years
- often requires highly trained and skilled workers
- serves many types of planting needs
- needs permanent nursery structures ; e.g., Office, store, shed house, propagation structure, permanent water source etc,

Quality criteria for temporary nursery

The quality parameters of the temporary nursery are as follows:

Major criteria:

Proximity to planting sites

- The site should be near enough to easy transport
- It should be readily accessible to vehicles
- It should be easily accessible to the target users or seedling buyers

Soil condition of the nursery area

- Should be good enough for raising seedlings
- Availability of top soil, sand or “Bit Mati” or sandy loamy soil and cowdung
- Availability of mulching materials

Irrigation and drainage facilities

- A source of irrigation water should be available throughout the year
- The nursery area should at all times be well-drained and free from flood water or logged water

Accessibility to the users and workers

- Easy accessibility to the target tree planters
- Easy accessibility to the nursery workers
- Easy accessibility to the potential buyers and users of seedlings

Quantity of seedlings to be raised

- The number of the seedlings should be according to the nursery area
- Crowding of seedlings should be avoided

Minor criteria:*Skilled manpower*

- Some skilled manpower should be present for root pruning, uprooting and hardening of the seedlings before sale to the customers

Fencing

- Temporary fencing may be provided to protect the seedlings

Quality criteria for permanent nursery

Every component of a permanent nursery must be arranged in a sequential way. The components should be designed before the establishment of the nursery. Once the nursery is set up, it is difficult to rearrange the permanent structure. All major and minor criteria for temporary nurseries must also be considered in the case of permanent nurseries. The quality criteria for a permanent nursery are as follows:

Major criteria:*a) Nursery Layout*

The layout or ground plan of the nursery is an important and major consideration for the smooth operation of the nursery. It includes the position of permanent and transferable structures within the nursery, e.g., office, sales centre, water source, seedbed, store, roads and path, irrigation and drainage channel, greenhouse, potting shed, compost pit, soil depots, etc. As VFFP activities are associated with village-based nurseries, the minimum components of the layout should be:

- On the level land seedbeds and potting beds should be laid out in the east-west direction to provide the seedlings uniform exposure to light.
- For permanent nurseries, the growing areas should be divided into blocks, each block containing about 10-12 seed beds or pot beds, each with proper numbering and leveling, differentiating fruit tree blocks, timber tree blocks, ornamental blocks, flower blocks and vegetable blocks.
- Mother tree blocks should be at the west-south corner of the nursery.
- In a good nursery there is a space of 40 to 50 cm **between** the beds, and 1.5 to 2 meters as pathway between the blocks. In a permanent nursery the pathway should be 3 meters wide, allowing any type of vehicle to pass through.
- Drainage canals should be at least 30 cm wide and 30 cm deep on both side of the pathway.
- Other structures should be considered in such a way as not to hamper any activity of the nursery.

b) Nursery sites

- The site should be near enough to easy transport.
- It should be readily accessible to vehicles.
- It should be easily accessible to the target users or seedling buyers.

c) Soil condition of the nursery area

- The soil of the nursery area should be good enough for raising seedlings.
- Top soil, sand or "Bit Mati" or sandy loamy soil and cowdung should be available.
- Mulching material should be available.

- d) *Irrigation and drainage facilities*
 - A source of irrigation water should be available throughout the year.
 - The nursery area should have a well-planned irrigation and drainage system.
- e) *Accessibility for the users and workers*
 - Easy accessibility to the target tree planters
 - Easy accessibility to the nursery workers
 - Easy accessibility to the potential buyers and users of seedlings
- f) *Open sunlight and shade trees*
 - The nursery land must be open and have enough sunlight.
 - Shade trees are required for some seedlings during the dry period and must be of the leguminous family whose leaf canopy is less dense than other trees.
- g) *Presence of a Mother Tree Block or Mother Trees of a desirable quality species*
- h) *Elevated land, free from flood or stagnant water*
- i) *Demand of produced seedlings in the locality/surroundings*
 - The number of seedling should be according to the nursery area
 - Crowding of seedlings should be prevented
- j) *Permanent fencing*
 - Well-managed phytosanitary activities
 - Varietal type of seedlings with enduring quality and true-to-type

Minor criteria:

Minor criteria are not always essential for a nursery, but the presence of these components will increase the efficiency of the activity of nursery entrepreneurship. The minor criteria are as follows:

- a) *Skilled Manpower e.g. : Skilled grafter, skilled root pruner, expert in identification of variety/ quality seedlings*
 - Use of Polly bags for raising seedlings/grafts (25 cm diameter and 30 cm depth)
 - Permanent labour and guard
 - Near homestead or city/town
 - Presence of shade house for propagation purposes

b) Quality Criteria for Plant Nursery Products/planting materials

Different types of planting materials are used both in fruit tree and non-fruit tree plantation. In the case of fruit tree plantations it is best to use vegetatively propagated planting material in order to maintain quality as only through vegetative propagation will it be possible to have plants which are true-to-type.

Quality criteria for grafts, gootees or cuttings

The vegetatively propagated planting materials (used as foundation stocks) must ensure the following parameters :

- The graft must be true-to-type
- It must be free from disease, especially diseases like **mango gall**, **anthracnose**, **virus** contamination and **malformation**.
- There should not be any incompatibility between graft union; i.e.,
 - Marked differences in growth rate or in vigour of rootstock and scion
 - Overgrowth above or below the graft union

- Growth of the rootstock must not be more than that of the scion
- Diameter of the rootstock should not be more than that of the scion
- Graft union should be well joined
- There must not be any fungal/bacterial attack at the graft union
- Grafting should be with one-year-old rootstock at 10-20cm above ground level.
- No suckering of rootstock
- Graft components breaking apart cleanly at the graft union
- Delayed growth of scion with yellowing/ die-back
- Graft growing in 30cm x 25cm plastic bag with a least 1:5 root shoot ratio (actual recommendation is 1:2 which is not yet feasible in Bangladesh)
- Foundation stock with any attack by insects, injured or broken during transport is of inferior quality
- Graft with physiological disorders is of inferior quality
- Every graft should be tagged properly
- In case of air layering the layerage should be erect, strong with vigorous growth and numerous roots

Quality criteria for timber tree seedlings

As most of the timber is directly propagated from seed, it is difficult to maintain actual quality of the seedling as it is a zygotic seedling and does not possess 100% of its parental characteristics due to cross pollination. Occasionally, even the produced seedlings possess inbreeding depression due to self-pollination or intra-specific pollination. However, the following parameters can be considered during selection of the seedlings in the nursery:

a) *Measurable parameters:*

- Vigorous growth with a strong and erect stem
- Free from disease infestation
- Uniform size
- Lesser branching habit
- Seedlings growing in Polly bags of 30cm x 20cm maintaining at least 1:5 root shoot ratio
- Any plants with pale and deformed leaves are considered low quality seedlings
- Free from any type of pathogen or injury caused by transport
- Seedlings with any type of physiological disorder

b) *Non-measurable parameters:*

- Quick growing with clean bole
- Disease and insect resistant
- Tolerant to wind and stagnant water
- Tolerant to salinity and adverse soil conditions
- Good timber quality

Quality Promotion Strategies (Nursery Level)

By M.A. Quddus

1. Quality Audit.

Annual audit (assessment) of the condition of the nurseries will make the nursery owners aware of their deficiencies - leading them to undertake measures for the improvement of their nursery practices. The nursery audit is also needed for VFFP to plan its training from for the NMs.

2. Quality Certification

A system of quality certification may promote the sale of the good (certified) nurseries – outcompeting the poor (non-certified) nurseries. The market force will ultimately lead most of the nurseries to improve their conditions and achieve the quality certification for the sake of their survival in the market.

3. Incentives/Awards

VFFP may undertake a programme of awarding the best nurseries (1st, 2nd, 3rd, etc.) of the respective NGO/region, which will create competition among the nursery owners for achieving higher quality of their nurseries and nursery products.

4. Expulsion

The nurseries not complying with the recommendations made by VFFP, on the basis of the nursery audit, may be dropped from the project i.e., from the NMS and VFFP's technical support. This may act as a push factor for quality improvement.

5. Training

Training of the nursery owners should continue until the desired quality standard is achieved in most nurseries.

6. Facilitation of NMs' access to improved germplasm

Since the nursery owners have limited knowledge about the sources of, and access to, the sources of quality germplasms, VFFP should help them in this regard by providing information and assistance in the procurement of foundation stock.

7. Demand creation

Demand and sale of the quality planting materials can be raised through campaign (farmers' awareness creation and motivation) and information dissemination.

8. Action research/Demonstration

Action research or participatory observation of the relative performance of improved germplasms, propagation techniques and management of the seedlings against the existing practices may motivate the nursery owners to adopt the improved germplasms and practices.

Parameters for the quality audit of nurseries

By M.N. Islam, revised by C. Didier

A. Nursery Planning and Design

1. Nursery layout
2. Internal pathway of the nursery
3. Road communication
4. Irrigation and drainage Facilities

B. Nursery Management

5. Seed bed preparation
6. Maintenance of proper spacing between the seedlings in the seedbed
7. Use of Polly bags for raising seedlings
8. Size of the Polly bag (properly maintained when and wherever necessary)
9. Arrangement of seedlings (arranged in fruit, timber and flower blocks)
10. Root-shoot ratio
11. Shoot pruning of seedlings at nursery
12. Root pruning and hardening
13. Insect pest and disease management including phytosanitary activities
14. General management (cleaning, weeding, timely irrigation, etc)
15. Use of proper pot mixture (75% sandy soil + 25% decomposed cow dung, 50% sandy soil + 50% decomposed cow dung, and 25% sandy soil + 75% decomposed cow dung for selling seedlings within one, two and three years, respectively)
16. Presence of MTO or source of quality propagules (scion / seed /bud stick etc.)
17. Quality of the vegetatively propagated planting materials produced (true-to-type, grafted at proper height, sold at proper age, no graft incompatibility, pest and disease free, properly tagged, etc.)
18. Use of quality rootstock for grafting purposes (selection of disease free mother tree for rootstock, growing rootstock in raised bed, maintaining proper distance, etc.)
19. Marketing facilities

Assessment procedure : To assess a nursery, a score has to be assigned against each of the above quality parameters - using a common scale (e.g., 1 – 5 for very poor to excellent) and then the score for all the parameters has to be added up to get the total score . The nursery will be graded (excellent, good, fair, poor, etc.) on the basis of the total score, using a common scale for all nurseries.

2. ORCHARDS

During visits to the orchards, the questions that are asked by the farmers are nearly always the same, just varying slightly according to species encountered. The general concerns of the farmers were:

- irregular fruiting
- fruit drop at all stages of growth
- poor production
- pests and diseases

These problems can be solved by the training of farmers using trained Field Supervisors who are often novices in this area. An inventory of pests and diseases presently found in orchards is available for Bangladesh. It will have to be reviewed and completed so that the farmers' questions can be answered regarding identification and advice as to the choice of products and times of application.

Common diseases and Insect pests of fruits in Bangladesh.

Fruit Species	Disease	Pathogen/Insect	Kind of Pathogen	Economic Importance
Diseases of fruit usually reported in Bangladesh				
Mango	Anthracnose/ Dieback	<i>Colletotrichum gloeosporioides</i>	Fungus	Major
	Stem rot	<i>Dothiorella mangiferae</i>	Fungus	Major
	Leaf spot	<i>Pestalotia mangiferae</i>	Fungus	Minor
	Red rust	<i>Alternaria alternata</i>	Fungus	Minor
	Red leaf spot	<i>Cephaleuros virescens</i>	Fungus	Minor
	Blight	<i>Macrophoma mangiferae</i>	Fungus	Minor
	Powdery mildew	<i>Oidium mangiferae</i>	Fungus	Minor
Guava	Wilt	<i>Fusarium sp.</i> , <i>Cephalosporium sp.</i>	Fungus	Major
	Fruit rot	<i>Botryodiplodia theobromae</i> <i>Phytophthora parasutuca</i>	Fungus	Major
	Anthracnose	<i>Colletotrichum gloesporides</i>	Fungus	Major
	Leaf spot	<i>Pestalotia sp.</i> <i>Cephalosporium parasitica</i>	Fungus	Minor
	Stem rot	<i>Physalospora sp.</i>	Fungus	Minor
	Scab	<i>Pestalotia pisidii</i>	Fungus	Minor
Jackfruit	Leaf spot	<i>Colletotrichum lagenarium</i> <i>Sphaeropsis sp.</i>	Fungus	Major
	Inflorescence/fruit spot	<i>Rhizopus artocarpi</i>	Fungus	Major
	Stem rot	<i>Curvularia sp.</i> <i>Alternaria sp.</i>	Fungus	Minor
Citrus	Root-rots	<i>Fusarium sp.</i> , <i>Diplodia sp.</i> , <i>Macrophomina sp.</i> , <i>Ganoderma sp.</i>	Fungus	Major
	Die back	<i>Colletotrichum gloesporioides</i>	Fungus	Major
	Sooty mould	<i>Capnodium citri</i>	Fungus	Major
	Gummosis	<i>Phytophthora sp.</i>	Fungus	Major
	Scab	<i>Sphaceloma fawcettii</i>	Fungus	Major
	Greening (Hung long bing)	<i>Mycoplasma</i>	Mycoplasma	Major
	Tristeza	<i>Virus</i>	Virus	Minor
Jujube	Powdery mildew	<i>Oidium erysiphoides</i>	Fungus	Major

Fruit Species	Disease	Pathogen/Insect	Kind of Pathogen	Economic Importance
	Leaf spot	<i>Cladosporium sp.</i> <i>Isariopsis sp.</i>	Fungus	Minor
	Sooty mould	<i>Capnodium sp.</i>	Fungus	Minor
Insect pest of fruits usually found in Bangladesh				
Mango	Hopper	<i>Amritodus atkinsoni</i> , <i>Idioscopus clypealis</i> and <i>I. niveosparsus</i>	Homopteran insect	Major
	Shoot-gall Psyllid	<i>Apsylla cistellata</i>	Homopteran insect	Major
	Mango fruit fly	<i>Dacus dorsalis</i>	Dipterian insect	Major
	Fruit weevil	<i>Sternochetus frigidus</i>	Coleopteran insect	Major
	Mango defoliator	<i>Circula trifenestrata</i>	Lepidopteran insect	Major
	Mango stem borer	<i>Batocera rubus</i>	Coleopteran insect	Major
Guava	Spiraling whitefly	<i>Aleurodicus disperses</i>	Homopteran insect	Major
	Mealy bug	Several species	Homopteran insect	Major
	Scale insect	Several species	Homopteran insect	Minor
Jackfruit	Jackfruit borer	<i>Margaronia caesalis</i>	Lepidopteran insect	Major
Citrus	Lemon butterfly	<i>Papilio demodoceus</i>	Lepidopterin Insect	Major
	Citrus leaf minor	<i>Phyllocnistis citrella</i>	Lepidopterin Insect	Major
	Citrus Psylla	<i>Diaphorina citri</i>	Homptertian insect	Minor
	Fruit sucking moth	<i>Othreis fullonia</i> and other species	-	Minor
Jujube	Fruit fly	<i>Carpomyia vesuviana</i>	Dipterian insect	Major
	Fruit borer	<i>Meridarchis scyroides</i>	Lepidopteran insect	Major
	Leaf-eating caterpillars, Beetles and Weevils	<i>Lepidopteran and Coleopteran insect</i>	-	Minor

This partial list should be published by the concerned staff of BAU/FTIP so that they can more easily respond to the problems presented to them.

Solutions

In order to supply answers to the problems mentioned above, trials must be established both at BAU as well as in the field so that results can quickly be transmitted to the tree farmers.

These trials will include fertilization, irrigation, pruning, phytosanitary treatment and will be repeated as frequently as the number of staff allow. Preference will have to be given to the quality of monitoring rather than the quantity of experimental plots covered. Trials in the field environment would allow the tree farmers to learn about the reality at the time of monitoring a good plantation.

These trials could present an opportunity to compare a plot managed according to the usual practice, with another plot managed according to recommendations newly advocated in the technical files. Trials in the countryside have the advantage of being a showcase as well as a training support in the field for the tree farmer.

In the case of more specific trials: determining the dosage and dates of the supply of fertiliser, irrigation needs, technique of size and weeding. etc., trials in the experimental station must be set up at the same time in order to define the rules which are the best adapted for these different interventions.

Numerous orchards are planted with very variable densities for mango trees as well as for guava, jackfruit and citrus fruits. Farmers should be advised of plant spacing, which would be appropriate for their particular objectives.

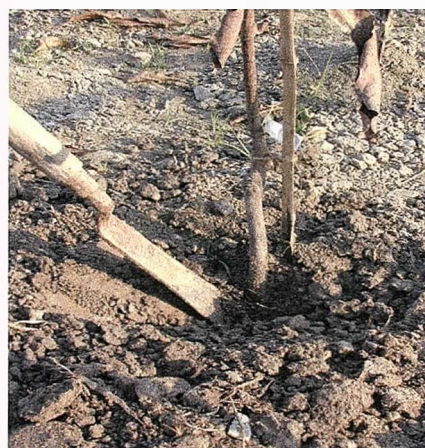
Technical manuals giving recommendations will be placed at the disposal of the tree farmers so that they will be capable of monitoring their own products rather than having to resort to field supervisors.

3. MOTHER TREE ORCHARDS

The majority of Mother Tree Orchards is correctly set up with the same configuration for all orchards. The maintenance is carried out correctly and growth is very healthy.

A few small problems remain which will have to be resolved:

- Uproot old trees growing in the middle or on the border of these orchards
- Better phytosanitary monitoring, it is advisable to avoid propagation of the woody parts near the disease which could be transmitted to a young grafted plant
- Planting should be done more carefully to avoid disappointments during the recovery.
- Trees must be correctly pruned and at the right time to obtain a larger quantity of scions.
- Carefully monitor orchards planted as hedges since the management of these types of orchards is very different from the usual plantations.
- When intercropping is carried out leave a free space of about one meter around the trees



Mango saplings planted in an MTO died due to planting too deep

- Guava trees should be included in Mother Tree Orchards
- Plants for the establishment of Mother Tree Orchards should be produced in Rajshahi

4. ADAPTATION TRIALS

Several varietal trial orchards have been established during the past year in different zones of Bangladesh. These research orchards consist of mango or guava trees. The varieties planted in these mango orchards are newly introduced varieties, dwarf or semi-dwarf. In the year 2000, new orchards have been created with varieties introduced from India capable of improving on local varieties or those introduced previously.

As far as guava trees are concerned, 10 varieties have been studied in these research orchards. The study deals with the performance of these new varieties as well as their tolerance/resistance to biotic and abiotic factors.

In these orchards, follow-up of maintenance must be done in the same way as for a commercial orchard : size, fertilisation, phytosanitary treatment etc. In the case of intercropping, the cultivated species will be the same for the whole of the orchards in order to have unbiased results.

Careful attention must be given to the gathering of data in order to minimise the « observer » effect. It will be advisable to have at one's disposal data comparable from one place to another: preferably quantitative measurements following standard procedures. Standardisation of procedures is achieved by producing a common protocol as well as subsequent training of recorders.

5. TRAINING

This is a major problem and it is of paramount importance that it be resolved. It concerns the nursery owners as much as the 'field supervisors'. In fact, training of the latter has taken place in May 2000 in the Bangladesh Agricultural University of Mymensingh. On that date 22 people received training. Four out of 9 PNGO staff of VFFP having received this training have left the NGOs and only 5 are remaining at this moment. To fill this gap an intake of young people has been employed. They must now be trained as quickly as possible.

At the level of VFFP and ARC, discussions have taken place to proceed within 6 months with training including FS(NMS), Project Coordinators as well as Project Officers (these latter being permanent). Following this cycle, the members of NMSs will be trained by the FS(NMS) and the PCs. The POs will remain vigilant as to the quality of this instruction to avoid any deviation which is always a possibility in these cases.

The training effected by BAU-DH is of a good standard. The programmes are coherent but perhaps not sufficiently adapted to the level of those individuals to be trained.

Theoretical knowledge is indispensable to understand the functions of the plants, the physiology of fruits, etc. In other respects, the demand coming from the field is situated at a certain level. For the training to correspond to the demand it must be able to adapt to different forms. The meeting which was organised by Dr. A. Quddus in Rajshahi on the 26th of October went in this direction. It raised issues which were relevant to the present situation.

6. RESEARCH

As far as research and the strong partnership between BAU-FTIP and VFFP is concerned, a document prepared by M. Nurul Islam and reviewed by both of us, sets out the strategy for the results of the research/development to be rapidly transferred to the field and to the participants.

6.1 Research Strategy of Fruit Tree Improvement Activities (M. N. Islam and C. Didier)

Introduction

The Village and Farm Forestry Project (VFFP) has started fruit tree improvement related activities as from June 1999. During this time it has spent one and half years gathering a lot experiential learning in the field of fruit tree improvement activities. The Fruit Tree Unit of VFFP is directly associated with this programme under the technical guidance of the Fruit Tree Improvement Project of the Department of Horticulture, Bangladesh Agricultural University (FTIP-BAU-DH), Mymensingh. Fruit tree improvement activities are associated with extension of improved and tested technologies through different existing extension systems of VFFP and CARE-SHABGE. Its intervention is on-station and on-farm research of new technologies and adaptation thereto as demanded by farmers. In order to insure the acceptance of research results, the research strategy itself should be based on the identification of the farmers' problems in the project area.

Identification of the problems

The fruit tree improvement related research problems should be identified on the basis of farmers' problems. The problems will be identified by the field worker (PC of NGOP of VFFP and FC of PNGO of CARE-SHABGE) of the concerned NGOP/NGOP and will be sent to the Regional Manager of RSC/Project Manager of CARE-SHABGE. The problems will be then sorted out and prioritised by the RM-RSC-VFFP/PM, CARE-SHABGE and will be sent to the Head, Agroforestry Resource Centre (H, ARC). The Head, ARC with the consultation of FTU and FTIP-BAU-DH, Mymensingh will make a research plan for the identified problems. For the identification of the research problems and to avoid duplication of the research activities, FTU will communicate continuously with the Fruit Research Stations of BARI and will review the yearly research plan of BARI before sorting out and finalising the research plan.

MS/PhD students of FTIP, through a rapid survey, can also identify problems in the field. In this case FTIP will prioritise the problems in a meeting with the Head, ARC and FTU.

The research problems will be identified along the following aspects:

A. On-farm

- Adaptation trial of newly introduced varieties of different fruit species (Mango, Guava, Jackfruit, Jujube and citrus) with the farmer's specific interest in mind
- Incorporation of short term fruit species under the unused mango and guava orchard to incorporate better orchard floor management

- Action research on total package of fruit tree management, comparing farmers' practices to ensure better yields in mango and guava
- Action research on different aspects of propagation of fruit trees, which are of special interest to the farmers
- Research on the adaptation of tested dwarf varieties of different fruit species within the homestead of marginal and small farmers (started in Adaptation trials)
- Research on the ICM of fruits with special emphasis on malformation and hopper in mango, and wilt in guava.
- Research on the zoning of different species of fruits (on-going Adaptation Trials)
- Research on the harvesting and post-harvesting technologies of fruits (Bibliography)
- Research on the marketing of fruits and fruit products (Bibliography)
- Other new and problems of greater importance identified in the field.

B. On-station

- Propagation of fruit trees, especially mango, guava, jackfruit and citrus
- Multi-storied cropping system (on-going in BAU-DH)
- Harvesting and post-harvesting technologies of fruits
- Marketing of fruits and fruit products
- Other problems identified in the field by VFFP and CARE-SHABGE
- Problems associated with BAU mandate

It is noted that the various activities concerning on-station research will be done by FTIP-BAU-DH who will send a copy of the research plan to CPA, IC and another copy to Head, ARC-VFFP. Concerning on-farm research the design and the theme will be discussed with BAU-DH.

Preparation of research plan: Every problem identified from the field will be prioritised by FTU-ARC on the basis of need and feasibility. Then FTU-ARC will prepare a research plan based on the priorities of each problem. Complex research and difficult to execute by FTU-ARC will be handed over by FTU-ARC to FTIP-BAU-DH and that will be conducted in the GP center and/or on-farm. Both the on-station and on-farm yearly research plan will be finalized in a meeting with BAU-DH, Head, ARC, HNCU and the representatives of FTU before execution.

Orientation of execution level: ARC will arrange a one/two day orientation of Regional Managers, Project Officers and Project Coordinators of the concerned PNGOs of VFFP/FC, PDO-Action research of CARE-SHABGE, before setting up field research activities for the tree farmers. FTU-ARC will provide all types of technical orientation with the help of FTIP-BAU-DH.

Implementation of research activities: The NGOP of VFFP and PNGO of CARE-SHABGE will directly implement the research activities under the supervision of the RSC of VFFP/ Project Manager of CARE-SHABGE. All sorts of technical support will be provided by FTU-ARC- VFFP with the consultation of FTIP-BAU-DH (as and when necessary).

Site selection and farmer selection: The site will be selected in a strategic location with an excellent demonstration value. The selected site must be suitable for conducting research. The tree farmer will primarily be selected in a meeting by the TFG of the concerned area. In the case of CARE-SHABGE the farmer will be selected through a FSS meeting or a meeting of LEA. Then the PC/FC of the concerned PNGO will visit the site with representatives from RSC-VFFP/PM CARE-SHABGE and will confirm the site. The final selection of

the site will be done by a team consisting of FTU, ARC, NCU and FTIP representatives. During the site selection it should be clearly explained to the farmer by the PC/FC of the concerned PNGO that the tree farmer runs certain risks during this research and that he may incur certain losses which he will not be able to recuperate. This should be made very clear to the farmer. A contract will be signed between the farmer and VFFP/ARC.

Layout, pit preparation and planting: Layout, pit preparation and planting will be directly done by the concerned PNGO with the support of RSC of VFFP / PM of CARE-SHABGE through the technical help of FTU-ARC if necessary. FTU-ARC will provide necessary technical orientation to the staff prior to setting up the research activities.

Collection of foundation stocks: The foundation stocks will be supplied by FTIP-BAU-DH. FTU-ARC can also collect foundation stocks. In this case FTU will collect the stocks after the proper certification of FTIP-BAU-DH. The concerned PNGO will receive the foundation stocks from FTU-ARC through RM-RSC-VFFP/PM CARE-SHABGE. The PNGO will then send a requisition to the RSC-VFFP/PM, CARE-SHABGE at least 60 days before plantation, with the name and quantity of the required stocks. As per demand of the RSC's and PM, CARE-SHABGE, FTU will have the foundation stocks ready 10 days prior to plantation.

Research Input: All cost of research input (except labour and fencing) will be borne by the budget of the concerned PNGO/NGOP through RSC/PM CARE-SHABGE. A tentative estimated budget for the research will be provided by FTU-ARC during the orientation programme. It is noted that some research will take up to 3 or 4 years before coming to a conclusion. Therefore, up until completion or before obtaining any expected result, the concerned PNGO will have to bear all sorts of expenditure with proper monitoring. As it is a anticipatory research activity, all labour and fencing cost will be provided by the farmer as direct participation.

Monitoring, data collection and reporting: Research is a very sensitive activity. If there is a lack of proper monitoring all activities will be in vain. PNGO staff will do regular fortnightly monitoring. Monthly close monitoring will be done by the RSC-VFFP/ PM CARE-SHABGE. Timely data collection will be done by the concerned PC/FC in the prescribed form within the prescribed time and directly sent to RSC/PM-CARE-SHABGE with a regular monthly report. The collected data will be analyzed and interpreted by the monitoring cell of VFFP with the consultation of FTU-ARC (if necessary). After analysis by the monitoring cell of VFFP the complete set of data will be sent to FTU-ARC and NCU.

Research planning and review meeting: Research planning will be done in a planning and review meeting. The meeting will be held annually before execution of the research programme in the field. In the review meeting every Regional Manager and PM of CARE-SHABGE will present the progress and the constraints of their last year's research activities. Accordingly, the next year's research plan will be submitted by RM-RSC-VFFP and PDO-Research of CARE-SHABGE as per priorities of the problems which will be finalized in the meeting. The Head of ARC-VFFP will arrange and coordinate the meeting. The meeting will be participated in by POs and RMs of VFFP, PM and PDOs of CARE-SHABGE, FTU-ARC-VFFP, Head- NCU-VFFP, Head-ARC-VFFP, Scientists from the Fruit Research Centre of BARI and DDAE of Rajshahi.

6.2 Prioritized research problems for the MS/Ph.D Students of FTIP-BAU-DH under the sixth Phase of VFFP

1. Integrated Crop Management (ICM) in Mango with special emphasis on hopper and shoot/twig gall.
2. Integrated Crop Management (ICM) in guava with special emphasis on wilting of Kazi guava.
3. Identification and characterization of newly introduced Dwarf varieties of mango in Bangladesh
4. Grafting in guava with wilt resistant rootstock to overcome wilting problem in Kazi piera.
5. Grafting in jackfruit with special emphasis on timber quality due to grafting.
6. Effect of training and pruning on off-season fruit production in guava.
7. Effect of training and pruning on fruit production in mango to overcome alternate bearing habit.
8. Multi-storied cropping system in mango with special emphasis on Barind, especially with short period fruit species.
9. Harvesting and post harvest technologies of fruit.
10. Marketing of fruits and fruit products.
11. Multi-storied cropping system in mango and guava orchards as a means for orchard floor management.

7. DOCUMENTATION

During this mission we had the opportunity to visit the library of the Bangladesh Agricultural University, Mymensingh. It has a good amount of reading matter, of which some is very recent. The University is also the depositary of the FAO library for the region. Hence, it contains all the documents which have been transmitted by this organisation. Its present problem stems from a lack of funds in order to subscribe to certain periodicals which have not been renewed.

The library of VFFP owns a certain amount of documents, photocopies and abstracts of articles. They are a personal documents and are therefore not for general circulation. It would be advisable to establish a record of literature required in a project's library.

A great number of basic references have been suggested in a document completed during the first mission.

8. NEXT MISSION

The next mission could be held during May or June 2001, and could have as its main topic : a survey into the problems of phytosanitation of nurseries and orchards. During this survey, which will be conducted by members of staff specialised in crop protection (entomology and phytopathology), advice and/or training with the PC, FS and NMSs could be planned.

Annex -1

TERMS OF REFERENCE

Fruit Tree Backstopping Mission of Christian Didier, October 2000

Background

SDC initiated the Village and Farm Forestry Programme (VFFP) in 1986 to promote and support tree planting on private land. Until the 5th phase, which ended in June 2000, the major focus of VFFP activities was on establishment of village-based nurseries to make planting materials available to the villagers ; these efforts have been remarkably successful. With VFFP's technical support (mainly training and information), about 2500 poor men and women have established tree nurseries which now run commercially. VFFP has also prompted and helped the nursery owners form their own business associations – initially a single association under each partner NGO but now re-organized upa-zila (lowermost administrative unit) wise. VFFP also undertook various combination interventions to motivate rural people to plant trees. As a result of these interventions (including similar efforts of other agencies), tree planting has now developed a momentum of its own. The 2500 VFFP nurseries now produce and sell more than 50 million saplings of fruit and timber trees that are planted by 700,000 farmers annually.

However, there has been a growing concern that qualitative aspects of tree growing activities, including the genetic quality of the planting materials and management of the trees, have not received enough emphasis to enable the farmers to obtain the best possible benefits from tree planting. In June 1999, in response to this need, SDC initiated a Fruit Tree Improvement Project (FTIP) to increase productivity and quality of fruit trees in the north-west region of Bangladesh. This involved the Horticulture Department of the Bangladesh Agricultural University (BAU-DH), VFFP and the SHABGE project of CARE. On the one hand, BAU-DH has been responsible for technology generation (research) and providing VFFP and SHABGE with the necessary technical backstopping (technical information, implementation guidelines, plan of action research and staff training) and improved genetic materials (foundation stock of improved varieties) for the establishment of Mother Tree Orchards by nursery owners. On the other hand, VFFP and SHABGE are responsible for implementation of the action research and extension activities. Initially, the fruit tree improvement activities were limited within Rajshahi region.

In the first year of the project (FTIP), the Fruit Tree Germplasm Centre at BAU, established earlier through SDC funding, was further strengthened by increasing its area and developing necessary infrastructures (land development, fencing, shade house). The number of accession was also increased and a number of trials on propagation/mass multiplication techniques, tree management and cropping systems were initiated in the germplasm centre. A three-week TOT course on MTO establishment, propagation techniques and management of fruit trees was also organized for the concerned staff of VFFP, SHABGE and their partner NGOs. Besides this, 12 MTOs of mango, two separate adaptation trials (replicated) on promising new varieties of mango (hybrid) and guava, and a replicated trial on multistorey cropping systems were established in the working areas of VFFP and SHABGE in the Rajshahi region. The initiated activities were well appreciated and there was a demand for replication and expansion from nursery owners, farmers and NGOs of all regions. Therefore, the decision was taken that fruit tree improvement activities be extended to all four regions of VFFP (also including SHABGE) during its 6th phase and activities have been started accordingly.

To ensure high quality of the fruit tree improvement activities (at FTIP, VFFP, SHABGE), it has been decided that an external backstopping Mission would be fielded twice a year. Accordingly, the first Mission took place in June 2000 suggesting some improvements to the on-going activities. The second Mission is now needed for the follow-up of the recommendations of the first Mission and for planning new activities, including expansion of the programme in the new regions.

General Objectives and Tasks

The overall objectives of the Mission are to assess relevance and methodological soundness of the on-going fruit tree improvement activities of FTIP, VFFP and SHABGE projects and to suggest necessary improvements thereof, including new activities in the light of the needs of the farmers and nursery owners vis-à-vis the state-of-the-art knowledge on horticultural science and technology.

Tasks

The Mission will comprise, but not necessarily be limited to, the following tasks:

1. Review the plan, strategies and on-going fruit tree improvement activities of FTIP, VFFP and CARE-SHABGE, as well as follow-up activities/actions initiated on the basis of the recommendations of the first backstopping Mission (June 2000) and suggest further improvements/actions.
2. Identify the problems of fruit trees in nurseries, homesteads and orchards in the different regions of VFFP and suggest necessary interventions (research, training, communication, etc.).
3. Identify/assess training needs of the nursery owners and fruit tree growers (farmers).
4. Review the existing/planned training programme, curricula and manuals of BAU-DH, VFFP and CARE-SHABGE and suggest necessary improvements thereto.
5. Review the fruit tree related documentation resources of FTIP (BAU-DH), VFFP and CARE-SHABGE.
6. Review the research proposals (thesis outline) of the Ph.D. and M.S. fellows under FTIP. Also suggest additional topics of research for the prospective Ph.D. and M.S. fellows regarding the priority needs of the nursery owners and fruit tree growers.
7. Review the draft Working Group report (in-house) on "Strategies of promoting quality of nursery and fruit tree management". Concentrate on the quality criteria (minimum standard) proposed for the nurseries and for planting materials, suggesting necessary improvements thereto.
8. Prepare and submit a Mission report containing the Mission's findings and recommendations.

Methodology

1. Review relevant documents of FTIP, VFFP and CARE-SHABGE, including the following:
 - Progress reports of FTIP, VFFP, SHABGE
 - Planning documents (work plans) of FTIP, VFFP, SHABGE
 - Working Group Report on "Strategies of promoting quality of nursery and fruit tree management"

- Thesis outlines of Ph.D. and M.S. fellows of FTIP
 - Existing training modules and manuals
2. Visit FTIP activities at BAU-DH, discuss essential issues with the FTIP team, including the investigators from Entomology and Plant Pathology departments. Also observe the TOT course on "Post-harvest technologies, integrated crop management and multistorey cropping system" which will be held during 11 - 26 October 2000 at the Graduate Training Institute of BAU, Mymensingh.
 3. Visit nurseries, homesteads, orchards and on-going fruit tree improvement activities in the working areas (different regions) of VFFP and SHABGE. Discuss essential issues (practices, problems) with the farmers, nursery owners and their associations as well as with the concerned project staff.
 4. Discuss the findings and tentative recommendations of the Mission with key staff of FTIP, VFFP and SHABGE in a workshop at Rajshahi around the end of the Mission.

Reporting

The Mission will produce a brief report containing the observations and recommendations of the Mission. It should be limited to 30 pages, typed with single spacing. However, the recommendations should be elaborate enough to enable the concerned persons to learn the logic and apply this in their work. Useful secondary information/publications related to the topics dealt with may be annexed with the report or supplied separately. The report should include an "Executive Summary" of not more than four pages.

A debriefing session should be held in the last week of the assignment. A mission report in French should be submitted in hard copy as well as in diskette/e-mail not later than two weeks after departure from Bangladesh

Duration and Time Frame

The duration of the Mission will be three weeks, starting around 9th October 2000. The tentative dates for the various activities are as follows:

Field work (including travel to and from Bangladesh): 12-30 October 2000

Draft report in French 15 November 2000

Final report: 31 December 2000

Annex-2

Programme Of Christian Didier
Fruit Tree Backstopping Mission – October 2000

<i>Date</i>	<i>Time</i>	<i>Activity</i>	<i>Location</i>	<i>Persons involved</i>
Fri 13 Weekend	12.50	Arrive at ZIA Rest	Dhaka	CD, NP, IC Driver
Sat 14 Weekend	09.00	Meeting at Programme Office regarding TOR & itinerary	Dhaka	CD, NP, AQ
	15.00	Drive to Mymensingh	Mymensingh	CD, AQ
Sun 15	09.00	Meeting with MAR status of germplasm centre, experiments, Ph.D & M.S. fellows, training, documentation	Mymensingh	MAR, CD, AQ
	11.30	Visit BAU Library		CD, AQ
	15.00	Visit CP Centre and experiments; meeting with ph.D. and M.S. Fellows		MAR, CD, AQ
Mon 16	08.30	Observe TOT (Review session; practicum at GP Centre)	Mymensingh	MAR, CD, AQ
	14.30	Meeting with FTIP Team		NP, AMF, MAR, KSI, AA, CD, AQ
	16.00	Visit GP Centre		AMF, MAR , NP, CD, AQ
Tue 17	07.00	Drive to Pabna		NP, CD, AQ
	11.00	Field visit (nurseries, MTOs, adaptation trials, NMS, etc.) and stay in Pabna		MK, NI, NP, CD, AQ, SA
Wed 18	9.30	Join SDC team (Head Asia-1) in visiting VFFP activities (nurseries, MTOs, adaptation trials, NMs, etc.) in Pabna	Pabna	MK, NI, NP, CD, AQ, SA
	15.00	Visit fruit tree improvement activities of CARE-SHABGE in Natore and that of VFFP along Natore-Rajshahi highway	Natore, Rajshahi	NI, FB, AQ, NP, CD
Thu 19	9.00	Meeting with VFFP-PMU staff (Familiarization with the new office and on-going activities, sharing ideas/plans about the workshop on the 27 th October)	Rajshahi	AQ, AH, CD, AQ
	13.30	Field visit (nurseries, MTOs, adaptation trials, etc) meeting with NMSs	Nawabgonj	NI, CD, MK
Fri 20	10.00	Field visit (nurseries, MTOs, adaptation trials, etc) meeting with NMSs	Rajshahi and Nawabjong	CD, NI

Date	Time	Activity	Location	Persons involved
Sat 21	8.00 10.00 10.30 11.00 1.00	Drive to Bogra Short briefing, inauguration of mini museum Field visit lemon and mango orchards TMSS NMS meeting Visit guava orchard and nurseries and meetings with NM	Bogra Upashahar, Bogra, Gakul Shibgonj, Bakchar Bogra	NI, SMH, CD
Sun 22	09.00 14.00 16.30	Meeting with the RSC and partner NGO staff (PC & FS-NMS) Drive to Kushtia Arrival in Kushtia	Bogra Kushtia	NI, CD, SMH NI, CD
Mon 23	08.00 9.00 11.00 14.30	Meeting at UDDIPAN office Field visit (nurseries, MTO, orchards, homestead Meeting with Bheramara UZ NMS Travel to Jessore Visit nurseries without MTO	Biswas Jessore	CD, NI GS, NI, CD,
Tue 24	09.00 14.00	Meeting with staff of RSC and partner NGOs (PCs) in Jessore région Drive back to Rajshahi	Jessore Rajshahi	SMH, NI, CD CD, NI
Wed 25	09.00	Preparations for workshop Synthesis of observations (desk work)	Rajshahi Rajshahi	NI, CD, AQ, AH NI, AQ, CD
Thu 26	09.00	Review the research proposals Review the draft on "strategies of promoting quality of nursery and fruit tree management" specially the quality criteria proposed for the nurseries planting material.	Rajshahi	CD, AQ, NI, AH
Fri 27	9.00 14.00	Discussion about training Workshop (sharing of Mission's findings, quality criteria for nurseries/planting materials, quality promotion strategies, research needs and priorities)	Rajshahi	AMF, MAR, CD, AQ, AH, NI, SA, IDOs, all POs (RSC, FTU), FB, PDO-Research of SHABGE
Sat 28	14.00	Drive to Dhaka	Dhaka	CD, NI, AQ, AMF
Sun 29	9.00	Debriefing at Programme Office Departure	IC Dhaka Dhaka	CD, NP, AQ, HJMK, MC CD

Abbreviations:

CD = Christian Didier, NP = Neil Parker, AM F= A.M. Farooque (Prof.), MAR = M.A. Rahim (Prof.), HJMK = H.J.M. Kamal, AQ = Abdul Quddus, AH = Azmul Huda, SMH = Syed Mahmudul Huq, NI = Nurul Islam, GS = Golam Sarwar, MK = Munzurul Karim, FB = Faruque Biswas (CARE-SHABGE), MC = Mohshina Chowdhury, PDO = Programme Development Officer

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